CLINICAL MEDICINE

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Editorial

Dr. William Beaumont

Army Surgeon and Pioneer in Gastric Physiology

ANDREAS VESALIUS laid the foundation for our knowledge of anatomy; Harvey first described the circulation of the blood; but it was an American—a general practitioner and humble Army surgeon—who first gave the world any accurate knowledge of the physiology of digestion.

The old and distinguished family of DeBeaumont had been prominent in French, Norman, and English history for centuries, and, in 1635, a representative of that family came to this country and settled at Lebanon, Connecticut, where, on November 21, 1785, William Beaumont was born.

He proved to be an ambitious lad and soon yearned to stand upon his own legs, so he left home and secured employment as a school teacher in the little town of Champlain, in New York.

About this time, he became acquainted with Dr. Pomeroy, of Burlington, Vermont, whose sympathetic advice crystalized young Beaumont's determination to study medicine. He entered the office of Dr. Benjamin Chandler, of St. Albans, where, in return for instruction, he did all sorts of odd jobs in the office and the house, while he learned the crude methods of diagnosis which were then in vogue, as well as how to bleed and cup, and how to recognize and prepare the various medicinal plants which grew in the surrounding woods. All this lore, as well as his own observations and ideas, he recorded in a note book, and the habits of accuracy in observation which this practice engendered, contributed largely to his success in later years.

When war with England was declared, in 1812, Beaumont immediately enlisted as a Surgeon's Mate, served with distinction, and gained much professional experience (all of which went into his notebook), for typhoid, erysipelas, malaria, and various other diseases were rampant among the ill-cared-for troops.

In 1820, Dr. Beaumont entered the Regular Army service as an Assistant Surgeon, and was at once assigned to the fur-trading, frontier post of Fort Mackinac, where, on June 6, 1822, a French employee of the trading post, Alexis St. Martin, was accidentally shot in the stomach with a shot-gun, at close range. The post surgeon, Dr. Beaumont, was hastily summoned and found the whole front of the young man's abdomen torn away. Though he did not expect St. Martin to live thirty-six hours, he did all that lay in his power, and had the joy of

being able to report, one year later, that, "The injured parts are sound and firmly cicatrized, with the exception of an aperture in the stomach and side."

It was through this "aperture" that Beaumont entered into deathless fame, for he not only saw, but *recognized*, that here was an unprecedented opportunity for studying the processes which take place in the stomach during digestion, and, in May, 1825, began his first series of the classical experiments with which every schoolboy is now familiar.

This work was, however, no sinecure, for St. Martin was an active young man, now in full health, who did not enjoy the morbid interest which his friends evinced in the "window in his stomach," and though he consented to accompany Dr. Beaumont when he was ordered to Fort Niagara, New York (at the doctor's expense), he soon ran away and joined his relatives in Canada. But Beaumont, though fully occupied with strenuous duties, did not lose interest in his unique patient.

In 1829, St. Martin was captured and brought to Fort Crawford, where Surgeon Beaumont was then stationed, and his interest was now thoroughly enlisted when the doctor offered to pay him $160.00 a year "and found" (an enormous wage for those days), if he would lend full cooperation in the experiments. Between December 6, 1829, and April 9, 1831, fifty-six experiments were recorded. In 1832, Beaumont was granted six months' leave and went, with St. Martin, to Washington, where he had the facilities of a large library and the cooperation of the ablest physicians of his time. The first edition of "Beaumont's Experiments" was published in 1833.

Among other notable services rendered by Dr. Beaumont was the introduction of vaccination to stop an epidemic of smallpox in the Fox River Valley, in 1827, he being the first physician to use this procedure for this purpose.

In 1835, Beaumont was ordered to Jefferson Barracks, Missouri, as the first Post Surgeon of that station, and, when he later resigned from the Army, he took up general practice in St. Louis and continued, a successful and beloved physician, until his death in 1853.

It is interesting to note that the harum-scarum young Frenchman, whose misfortune proved to be Dr. Beaumont's opportunity, lived to the good old age of 83 and died in 1880.

Here, then, is the brief story of a sincere and earnest physican, with no especial advantages except such as he made for himself, who rose to world-wide renown simply because he knew an opportunity when he saw it, and spared no pains or effort in making the most of the material which lay ready to his hand.

Socialized Medicine — With or Without a Period

AN ARTICLE by Michael Evans, in *Coronet*, for November, 1942, rather gleefully announces (as was to be expected from that magazine) that, due to the heavy demands for physicians in the armed forces, Socialized Medicine is *already here*, whether the doctors themselves or the A.M.A. like it or not.

That may be true, in a sense, or it may not, but in either case the American medical profession will still have something to say as to whether or not a period shall be placed after that statement.

No one wishes to interfere with the successful prosecution of the war, even though it was brought upon our people against their will, and medical men are as eager as anyone to do all in their power to bring it to a close as soon as possible; but there is a vast difference between meeting what appears to be a military necessity with as good grace as possible, and accepting political, bureaucratic control of our activities as a permanent national policy.

The National Physicians' Committee is doing a fine job of educating the people as to what Politicalized Medicine would mean to *them*, and we will be wise to cooperate with this high-minded group as fully as possible. Moreover, it now looks as if the 78th Congress will be a truly American one, committed to the *American* way of life, rather than to that of Russia, Britain, Germany, China, or any other country, so that letters addressed to our Congressmen, telling them just what we think about this and other matters, are likely to receive a more

sympathetic and cooperative response than they have in the immediate past.

With these two encouraging possibilities before us, it looks as if we will have no one but ourselves to blame if we let the "We planned it that way" boys write a period after their Socialized Medicine and carry on with it after the war is over.

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I find the great thing in this world is not so much where we stand, as in what direction we are moving.—O. W. HOLMES, M.D.

✦

Euthanasia

IF DARWIN'S dictum of the survival of the fittest were carried to its logical conclusion, every individual who is now an irrevocable burden upon the public resources would immediately be liquidated, as has been done (and probably is still being done) by certain primitive tribes.

Ever since men have been sufficiently evolved to pity the sufferings of other men, and of the beasts, the question has arisen of "putting them out of their misery" when their condition was hopeless, and in more or less civilized communities, the beasts have had the best of it.

Every physician who has practiced a few years has seen one or more patients who deserved and desired the final release from irremediable agony which would unhesitatingly be given to a dog or horse in similar circumstances, but may not legally be given to a man, because any person who deliberately shortens another's life, no matter how merciful his motive, is technically guilty of murder.

Most physicians of wide experience have, at one time or another, been brave enough to risk a trial, and possible conviction, on such a charge by conferring the bliss of death upon a hopeless sufferer, and thoughtful people are becoming more and more convinced that such "mercy killings" should be legalized.

Euthanasia has been seriously discussed for a number of years. In his book, "The Question Mark," published in 1926, Jaeger gives a rather detailed description of how this matter is supposed to be handled in the twenty-second century.

And now comes the Euthanasia Society of America, Inc., with definite plans for permitting the same merciful treatment to be given to men that is now given to animals, and overcoming the objections that have been urged against such a course of action.

Briefly, their plan is this: Any sane person over 21 years old, who suffers from a painful and hopeless condition, *may* apply to a court for euthanasia, accompanying his petition with an affidavit from his physician that his disease is incurable. The Court appoints three persons, two of whom must be physicians, to investigate the conditions carefully. If this commission reports favorably, a permit is granted and, *if the patient still desires it*, euthanasia is administered by any person chosen by the patient or the commission.

Note that such a law would be *permissive*, not mandatory, and that the request *must originate with the patient*, who can change his mind at any time before the deed is done.

In these days, when men are killing each other wholesale, for no better purpose than the aggrandizement or political safety of individuals or nations, there should certainly be no outcry against this strictly humanitarian, carefully-controlled, and retail taking of human lives, and we feel that the Euthanasia Society deserves the hearty support of the medical profession.

NEXT MONTH

Dr. Arthur E. Ewens, of Atlantic City, N. J., will describe and illustrate the technic of staphylectomy, and report his remarkable results with this operation.

A review of the uses and dangers of the various sulfonamides, collected from a number of sources, will appear.

COMING SOON

"Pictures for Medical Articles," by George B. Lake, M.D., Waukegan, Ill.

"A Simple Apparatus for Intravenous Infusions," by James A. Dungan, M.D., Greeley, Colo.

LEADING ARTICLES

Diseases of the Thyroid Gland

By ARNOLD S. JACKSON, M.D., F.A.C.S., *Madison, Wis.*

It is always helpful to the busy general clinician to have before him a brief resume, by a competent observer, of a common and complex disease like goiter, such as Dr. Jackson gives here, with important original ideas of the cycle of thyroid disease.

IN ORDER to understand the problem of goiter clearly, one must have in mind a simple classification, but here there are two schools of thought: those believing that toxic adenoma and exophthalmic goiter are merely variations of the same disease (Crile); and those who maintain that they are distinct clinical entities (Plummer). The end results of surgical treatment appear to be the same. Opinion appears to be about evenly divided on the subject. In this discussion the Plummer classification is used.

Disease of the thyroid gland may be classified as:

1. Goiter
2. Hypothyroidism
   - A. Cretinism
   - B. Myxedema
3. Malignant disease
4. Thyroiditis
5. Tuberculosis, syphilis, etc.

Goiter may be classified as:

1. Nontoxic
   - A. Colloid
   - B. Nontoxic adenoma
2. Toxic
   - A. Exophthalmic
   - B. Adenoma
     - a. Toxic
     - b. Induced iodine hyperthyroidism

Colloid Goiter is a symmetrical enlargement, appearing usually at puberty, and is about five times as frequent in women as in men (see Fig. 1). It is especially prevalent in the goiter belt extending from Boston to Seattle, and in the northern half of the continent, but it is a world-wide condition.

The *etiology* is unknown, but it is presumably due to lack of iodine in the soil and water, causing the thyroid gland to become overworked at puberty in its effort to supply the needs of the growing body for iodine. Many support the germ theory.

Fig. 1 (Left): A patient with colloid goiter, before treatment.
Fig. 2 (Right): A patient with non-toxic adenoma.

Treatment: Prevention is best. It may be absolutely prevented by the administration of 10 mg. of iodine during the school year, from the age of 4 to 21 years. All pregnant women residing in the goiter belt should receive a similar dose, unless there are special contraindications.

Treatment of colloid goiter by thyroid and iodine medication is occasionally successful. Iodized salt has been given the school children in Michigan since 1922, and also in other localities. Its results appear satisfactory when the iodine content of the salt is sufficient.

Adenomatous goiter causes an asymmetrical enlargement of the thyroid gland and frequently appears between the ages of 10 and 20 (see Fig. 2). It follows the distribution of colloid goiter and is a world-wide problem.

The *etiology* is unknown. It appears to develop in a neglected colloid goiter.

Prevent the latter and prevent adenoma.

Treatment: In small doses, iodine may retard its growth, in children, until they are of surgical age, but has no curative effect. In adults, leave it alone or remove it surgically. If not removed, it may enlarge outwardly, becoming disfiguring. Approximately 50 percent become substernal and 20 percent intrathoracic, and cause tracheal distortion, dyspnea, etc; also exert back pressure on the heart, with consequent enlargement. Approximately 2 percent become malignant. At the age of 50, about 50 percent are toxic. For these reasons I advise the removal of adenomatous goiters in persons over 20, unless there is a special contraindication. The younger the patient the more probable is a recurrence.

Toxic Adenoma: The onset of symptoms is so gradual and insidious as to be frequently overlooked (see Fig. 3). A gradual loss of strength and weight, slight tremor, palpitation, cardiac arrhythmia, hypertension, dyspnea, and edema are characteristic signs and symptoms. Exophthalmos, thrills, bruits, and crises with fever, as in exophthalmic goiters, are not seen.

Thirty-eight (38) percent of these cases show a favorable response to iodine, in preparation for surgery; 62 percent are not improved or may become worse, but the harmful effect is so slight that all cases may safely be given iodine for a week.

The *etiology* is unknown.

Treatment: The earlier in the disease thyroidectomy is performed, the less the risk. The basal metabolic rate (BMR) is not an index of the safety of operation. In the advanced stages of the disease the rate may be low. Prior to surgery, patients should be ambulatory, lugolized, and in the best possible condition. From one or four weeks' preparation may be required. Opinions differ as to digitalization. I digitalize. If in doubt, always do a two-stage thyroidectomy. The interval may be from two to three months. In the postoperative care, steam, a high caloric diet, iodine, and oxygen may help. Aspiration of mucous and constant nursing care are essential.

Pathology: The pathologic picture does not differ from that of a nontoxic adenoma, although occasional areas of hyperplasia may be seen.

Exophthalmic Goiter

The *etiology* is unknown. Many possible factors, such as infection, neurogenic, vitamin deficiency, adrenal, and chemical have been proposed.

Diagnosis: It occurs commonly in younger people (average age 33), but may appear at 2 or 82 years. By contrast the onset is rapid. The disease progresses in a series of waves, at the crest of which a crisis occurs.

Fig. 4. A patient with exophthalmic goiter: (Left) before operation; (Right) after operation.

Predominant *symptoms* are: nervousness; emotionalism; loss of weight, plus a good to ravenous appetite, followed by anorexia, nausea, and vomiting, with diarrhea and fever in a crisis; palpitation; rapid, pounding heart; insomnia; heat intolerance; increased sweating; and weakness, especially of the quadriceps.

Signs: Symmetrical enlargement of the thyroid, which may be slight or marked (see Fig. 4); thrills and bruits in 75 percent after six months; the eyes may be normal or show a stare or exophthalmos; BMR usually above plus 30 percent. Marked improvement follows the use of iodine, unless the patient is iodine-fast. The blood pressure shows a systolic normal or elevated, in longstanding cases, but the diastolic is low.

Treatment: Preparation for ten days, giving ten drops of iodine 3 times a day, plus a high-caloric diet and some rest in bed, is sufficient in most cases; a two-stage thyroidectomy is indicated in advanced or very toxic cases.

Operation: As much tissue as possible should be removed, without injuring the recurrent laryngeal nerves or the parathyroid glands. It is unnecessary to produce hypothyroidism to effect a satisfactory result.

Postoperative care is important, with continuation of rest, iodine, and a diet causing weight gain, as long as is indicated by the general condition and BMR. Patients who fail to gain weight usually

fail to recover. Permanent restriction of all stimulants and freedom from strain, tension, overwork, and infection should be urged.

Iodine hyperthyroidism is a toxic condition induced in nontoxic adenoma by prolonged, injudicious use of iodine. Through increased dissemination of knowledge, this syndrome is now seldom seen.

Fig. 3 (Left): A patient with toxic adenoma.
Fig. 5 (Right): A patient with malignant disease of the thyroid (lymphosarcoma).

Malignant disease of the thyroid nearly always has its inception in an adenomatous goiter and, when clinically diagnosed, is usually incurable.

Diagnosis: A hard, fixed mass (see Fig. 5); recent rapid growth; aphonia, dysphagia, and dyspnea.

Treatment: Early radical removal, followed by treatment with x-rays and radium.

Thyroiditis is rarely seen except in goiter centers. It may be acute or chronic; non-suppurative or suppurative. The purulent form suggests cellulitis in the region of the thyroid, often with aphonia, dyspnea, or cyanosis. Early drainage is imperative. Chronic thyroiditis, as Riedel's iron struma, is treated surgically.

Tuberculosis, syphilis, and other diseases of the thyroid are too rare to merit discussion, except in a special article.

Hypothyroidism is one of the most common and most frequently overlooked of all diseases. There are thousands of persons residing in the great goiter belt suffering from undiagnosed hypothyroidism. Other thousands are being given inert thyroid extracts, without benefit.

Diagnosis: Hypothyroidism is commonly overlooked because, for a half a century, medical students have been taught to look for obese persons suffering from loss of hair, dry skin, and inertia. Today we know that mild hypothyroidism may present none of the characteristics of myxedema or advanced hypothyroidism. It is prevalent among high school and college-age girls with menstrual irregularities. Thin, constipated, pepless individuals are often hypothyroid. It is a prime factor in many cases of sterility, of headache, and of mental retardation.

The BMR is valuable in detecting these cases. Many are treated for anemia, hypochlorhydria, low blood pressure, etc., all of which may be due to a lack of thyroid. Even the frank cases of myxedema are frequently overlooked and treated for myocardial or renal disease, because of edema. Such persons often are overweight and react slowly, mentally and physically. The lateral halves of the eyebrows are sparse; the hair may be scant and coarse; the skin dry and scaly. They may suffer from secondary anemia, lack of acid, and dyspnea. The pulse is slow, the blood pressure low. These people enjoy heat and suffer from the cold. If the government wants to conserve fuel oil, it might well run a BMR on all housewives and not a few husbands. Thyroid therapy would warm many and keep them comfortable in lower temperatures.

Treatment: The average case of hypothyroidism is started on one grain of desiccated thyroid gland daily. This dosage is doubled in a week, and then changed to whatever dose is necessary to maintain a BMR above zero. There is no particular benefit in the use of emplets or thyroxin.

Cretinism: In 1878, Jacobi reported the first case of cretinism in this country; in 1893, Osler reported 11 cases; in 1922, Gordon reported 228; and in 1934, I reported 512. Cretinism is obviously increasing and there are undoubtedly thousands of cases, of various degrees, hidden away on the farms and in villages and cities, of which there is no record.

Most of the textbooks have classified cretinism into an endemic and a sporadic form, the former occurring in Europe and Asia and the latter in the United States. Why the differentiation, I have not ascertained. It is said that, in endemic cretinism, goiter is commonly associated, whereas it is not seen in the sporadic form; also that patients of the endemic type reach a greater age. In the survey which I made in 1934, not only cretins with goiter, but elderly cretins were found in this country.

Cretinism is the end-result of goiter. In the older countries of the world, such as Switzerland and India, where goiter

has been prevalent for hundreds of years, cretinism is present in advanced stages, as a result of frequent intermarriage of descendants of goiterous ancestors. America, on the contrary, is now in the phase of hypothyroidism, or second stage. It is presumable that, with intermarriage of succeeding generations of hypothyroid persons, more advanced stages of the latter and more cretinism will appear. This will be true unless goiter is successfully eradicated.

Diagnosis: All mentally and physically backward children should be suspected of cretinism or hypothyroidism until proved otherwise. Early recognition, in infancy, may make a tremendous difference in the child's future. Diagnosis may occasionally be made within a few days or weeks after birth. Characteristic features are a potbellied, stupid-appearing infant with wide-set eyes, a saddle nose, jowls, protruding tongue, delayed development of the osseous system, and mental and general physical retardation.

Treatment: As a medical student I gained the impression that it was rarely possible to raise the mentality of these children above that of a six-year-old, and that treatment was seldom continued, so that the child regressed from that age.

A striking illustration to refute this idea is that of a patient, a daughter of an American General, who has been under treatment for fourteen years and is entering college this year with high scholastic grades. Several others are in high school and doing well. Many extremely discouraging-appearing cases show remarkable improvement under treatment.

Fifteen years ago I began giving these children whole pituitary gland, as well as thyroid, and later investigations showing influence of the pituitary upon the thyroid has substantiated this idea. The doses of these glands depends upon the age and tolerance of the child, and treatment is started with small doses, usually one-half grain daily.

Basal Metabolism and Thyroid Therapy

In concluding this brief summary of thyroid disease, mention should be made of two important subjects, the basal metabolic rate and thyroid therapy.

The metabolic rate is a much maligned test, in many instances rightly so because the test is either inaccurately determined or incorrectly interpreted. Many tests are incorrect because of a faulty machine, leaks, etc.; tests made under incorrect conditions, when the patient has eaten, has a fever, head cold, etc.; most frequently because the patient is nervous and breathes rapidly, thus giving an inaccurate elevation of the rate. In our file are records of many cases where a thyroidectomy has been advised in the presence of a normal thyroid gland, when tests had undoubtedly been made under such conditions.

The rate should never be taken as a guide to the risk of operation in toxic adenoma. Frequently, advanced cases will register tests not over plus 20 or plus 30 percent.

An accurate BMR is valuable in diagnosing functional and nervous diseases from true hyperthyroidism; in helping to gage the severity of the disease, especially in exophthalmic goiter; in evaluating the degree of improvement under either medication, surgery, or x-ray treatment; in diagnosing all types of hypothyroidism and myxedema and in determining the dosage of thyroid required to maintain a normal state; and in ruling out many conditions that may simulate either hypothyroidism or hyperthyroidism. Judging from an experience dealing with over 50,000 tests, I believe that the BMR is one of the most valuable of laboratory aids.

Thyroid therapy is of inestimable value when the product used is satisfactory and when it is administered correctly. Unfortunately a great deal of the thyroid being dispensed is of little value. It may deteriorate rapidly after three months; and is frequently dispensed from a bottle that has been on the shelf even for years. Certain products commonly used do not have nearly the potency of the others. The desiccated gland has been the most satisfactory in my experience. There are a number of good products. Two that have given results, in my experience, are Armour's and Parke, Davis'.

While surgery, in my opinion, is the choice of treatment for hyperthyroidism, x-rays, under skilled roentgenologists, has given good results in toning down severe cases so as to permit operation and in clearing up mild recurrent or persistent cases of exophthalmic goiter.

This is a large subject to cover in so brief a summary and it has been possible only to touch upon the more important points. As stated, many of these problems are still controversial, and the views expressed are my own. The presentation is not for those long experienced in the subject, but rather for the student or physician whose practice is not confined to this field.

Jackson Clinic

The Throat in Rheumatoid Arthritis*

By FRANK J. NOVAK, JR., M.D., *Chicago, Ill.*

Throat disorders have been given a prominent place in the etiology of rheumatoid arthritis, "on authority," but Dr. Novak suggests that the traditional attitude needs rather radical revision.

THE teaching, that there is a direct and causative relationship between focal infection and rheumatoid arthritis, is widely accepted in the United States, "on authority," but this is not so in Europe.

In this connection, the emphasis is strongly laid upon hypertrophy of the tonsils, diseased crypts, hyperemic pillars, gross lymph nodes on the posterior pharyngeal wall, and other *hypertropic* changes in Waldeyer's ring, as important sources of trouble; but the fact remains that patients with rheumatoid arthritis, who show hypertrophy in the throat, *are not benefited*, clinically, by the removal of these hyperplastic tissues.

On the other hand, there are many patients with rheumatoid arthritis in whom a careful inspection of the throat reveals no lymphoid tissue in the tonsil fossa, no hyperemia of the pillars, and a marked *atrophy* of Waldeyer's ring, with a clean, smooth, *pale-pink*, moist mucosa of the entire pharynx. Microscopic examination of such a mucosa shows an almost total *absence* of the usual innumerable small nests of lymphyocytes under the epithelium, which are usually of pinhead size, but may be so large as to form true terminal lymph nodules of considerable size. This absence of lymphocytes, in my opinion, plays a definite and important part in the clinical picture.

These atrophic throats are most commonly seen in *women* who give a clinical picture including, especially:

1. Pain in the joints, with stiffness of the fingers in the morning.
2. Abnormal fatigue.
3. A slight fever (99.0° to 99.6° F.) for periods of several weeks at a time.
4. Mucous colitis
5. Occasional mild soreness of the throat.
6. A low basal metabolic rate.
7. A thin, shiny, sensitive skin.

If the throats of these patients are carefully examined *in daylight*, at a time when they have slight fever and a slightly "scratchy" throat, a small area or areas will be found, on the generally pale mucosa, that show moderate hyperemia. If cultures are made from such areas, using a meticulous technic and inoculating a brain-heart infusion, hemolytic *streptococci* will invariably be found, if repeated cultures are made.

The finding of a hemolytic streptococcus in the throats of perfectly healthy individuals, especially during the winter months, is a common experience. It is, therefore, important to determine whether the particular streptococcus recovered from a certain throat is pathogenic for that individual at that particular time.

This can be ascertained by means of the *pathogen selective test*, devised by Solis Cohen and described in the *British Journal of Experimental Pathology* in 1927. The test is simple, and the result may be briefly stated thus: If an organism can be cultured on a patient's own blood, it may be presumed that it is pathogenic for that individual.

If a patient shows the symptom complex I have described, and from his throat a hemolytic streptococcus can be isolated which is positive to the pathogen selective test, that patient will be greatly benefited by a vaccine properly made from that organism and properly administered.

Such a vaccine is prepared by growing the personally-pathogenic streptococcus in brain-heart broth, killing it in the usual manner, and then adjusting it to contain, not many millions—or even billions—of germs to the cubic centimeter, but *5,000 organisms* to the cubic centimeter. The actual preparation and standardization of the vaccine must be done by one who is expert in such work.

Clinical experience has shown that such a vaccine works best when it is given *intradermally, changing the sites of the injections as widely as possible.*

The initial intradermal dose of this vaccine should be *0.1* cc. (500 organisms). If this produces no local or general reaction, and the patient feels better, it is the *optimum dose*, and should be *repeated* (not increased), at intervals of one week, for six or eight weeks, and then once a month for a year or more.

If a local or general reaction is produced, or the patient feels worse, the vaccine must be *diluted ten times*, and

*Presented before the Medical Round Table of Chicago, Dec. 8, 1942.

0.1 cc. (50 organisms) again given. If this causes a reaction, it must again be diluted ten times, and a dose given containing only *five* organisms.

When a dilution is reached, of which 0.1 cc. will produce no reaction, the dose should be slowly and cautiously increased until a quantity is reached that does so. The last previous dose, which produced no reaction, is thus established as the *optimum dose*, and the course of treatment is carried out as I have outlined.

In view of the facts that one of the factors in this clinical picture is mucous colitis, and that a portion of the intestine contains lymphoid structures somewhat similar to those found in the throat, it will be interesting to investigate whether there is a corresponding atrophy of the lymphoid structures in the bowel.

30 North Michigan Ave.

Congo Red Following Tonsillectomy*

By PAUL E. CRAIG, M.D., *Coffeyville, Kans.*

Perhaps the most disturbing complication of tonsillectomy is bleeding. Dr. Craig here shows how this may be avoided by a simple method.

CONGO red is a powerful, non-toxic, hemostatic agent with a specific vitamin K-like action on the cells of the reticulo-endothelial system, almost immediately arresting capillary hemorrhage by increasing the plasma prothrombin, by raising the blood-platelet count, and by decreasing the coagulation time.

It belongs to the electronegative, neutral, high-molecular dye stuffs and is used commercially to dye cotton, silk, and wool a deep scarlet. The purified drug, suitable for intravenous use, is reddish-brown in color and is readily soluble in water, forming a bright-red solution.

Experimental Studies

Barnes[1] demonstrated that the plasma prothrombin level of mice can be lowered by the addition of mineral oil to the diet, and that the diminished level of plasma prothrombin can be raised significantly by injections of Congo red and restored to normal by the parenteral administration of vitamin K. The hemostatic properties of Congo red are, then, explained, at least in part, by its vitamin K-like action in raising the blood prothrombin level, since both of these substances contain 1, 2, 3-substituted naphthalene radicals.

The toxicity and effect of Congo red on blood coagulation was shown by Taliaferro and Haag,[2] who injected from 1 to 5 cc. of a one-percent solution intravenously into rabbits, and found that it diminished the coagulation time in each animal. Injection of larger doses (200 or more milligrams per kilogram of weight) shortened the coagulation time still further, decreased the bleeding time, and increased the number of blood platelets. The minimum lethal dose of Congo red for rabbits was found to be the massive administration of 300 milligrams per kilogram of body weight. While injection of small doses produced rapid clotting *in vivo*, the same amounts had no effect on rabbit blood *in vitro*. This is particularly significant because it points to the central activity of Congo red on the cells of the reticulo-endothelial system, thereby activating thrombogen, increasing the formation of thrombokinase, and multiplying the blood platelets, with a resulting acceleration in clotting time.

Clinical Observations

Wedekind, Becker, and Wienert,[3] in 1930, first observed the hemostatic effect of Congo red on tuberculous patients suffering from frequent attacks of coughing accompanied by profuse hemoptysis. Each patient to whom the drug was given showed marked general improvement, with a cessation or lessening of the hemorrhage in every instance.

Graves[4] used Congo red to arrest bleeding from the genito-urinary tract in renal and ureteral calculi, and also following transuretheral prostatectomy, with uniformly satisfactory results.

Kittner[5] employed the drug in hemorrhage due to abortion, ectopic preg-

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nancy, and cervical polyposis, before and after operation, with excellent results, and discovered that Congo red is an effective therapeutic agent for the treatment of bleeding due to advanced carcinoma, where the hemorrhage developed slowly.

Arons[6] claims to have employed Congo red to stop active hemorrhage due to malignant disease, where ordinary medical measures have failed, and states that, in a large series of cases, he has encountered no complications whatsoever.

Agranat[7] reported 4 cases in which Congo red was used, with excellent results, in the control of severe gastric hemorrhage due to gastric and duodenal ulcers and to arrest hematemesis following operations on the stomach.

I use Congo red routinely in preparing jaundiced patients for surgery, and the results obtained compare favorably with the preoperative oral and parenteral administration of vitamin K. Interest thus awakened, prompted its use in tonsillectomy, probably the most bloody of all minor operations. Careful blood studies and clinical notes were made, before and after the injection of the drug, in a series of 100 patients, each of whom was subjected to operation.

Results of Clinical Investigation

One hundred (100) patients (37 adults and 63 children), with an age range from 4 to 62 years, were tonsillectomized. The snare, Sluder, and combined snare and Sluder technics were employed. The coagulation time, platelet count, and prothrombin bleeding time were taken on each individual before operation and from one to two hours after the intravenous injection of from 5 to 10 cc. of a one-percent solution of Congo red. Patients under 12 years were given 5 cc. of the dye upon completion of the operation, while still on the operating table. Those over 12 years of age received 10 cc. of the solution.

TABLE I. CLASSIFICATION OF CASES BEFORE INJECTION OF CONGO RED

Class	Percent of Cases	Range of Coag. Time Min.	Range of Prothrombin Time—Sec.	Range of Platelet Counts
A	34%	2.5-6	10-20	117,000-230,000
B	52%	5-7	21-46	98,000-114,000
C	14%	7-10	38-55	under 98,000

TABLE II. AFTER INJECTION OF CONGO RED

Class	Percent of Cases	Range of Coag. Time Min.	Range of Prothrombin Time-Sec.	Range of Platelet Counts
A	76%	2-3.5	8-20	118,000-242,000
B	24%	3.5-6	21-35	98,000-117,000
C	0	none over 6	none over 35	3% below 98,000

The Congo red solution† was drawn up into a 10-cc. syringe with a Luer-lock tip, and was injected slowly into the basilic vein in the forearm through a ⅝-inch, 25-gage needle. Fully eight minutes were taken for the injection, to insure gradual and continuous dissemination of the dye in the blood stream. Using the cuff of a blood pressure bag as a tourniquet, the venipuncture is made with the bevel of the needle adjacent to the skin; a slight negative drag

is exerted on the piston when entering the vein, release of the piston indicating entrance. Although Congo† red is not irritating to subcutaneous tissues, a deposit of the solution outside of the vein will discolor the skin, staining it a vivid red, which is slow to fade but will finally disappear after several weeks.

In every case the drug was well tolerated and no rigors were recorded in the entire series. Within 30 minutes after injection the saliva became pink, and was entirely clear at the end of the first hour. Only one case required a second injection of 10 cc. of the dye.

Analysis of the data on the hundred patients treated shows that they may be divided into three classes: Class A, those whose coagulation and prothrombin times, and platelet count, were within normal limits; Class B, an intermediate or border-line group; and Class C, those showing abnormally long coagulation and prothrombin times and low platelet count. The findings in these groups, before the use of Congo red, are summarized in Table I, and the conditions after its use in Table II. Note that the percentage of patients with normal findings (Class A) rose from 34 to 76, while Class C almost disappeared.

The response of these groups to Congo red injections showed that there was little change in the patients in Class A; the coagulation and prothrombin times were shortened and the platelets increased in the Class B group; while those in Class C showed marked improvement in the coagulation and prothrombin times, and the platelets increased to normal.

These data seem to indicate that the dye acts rapidly and efficiently in controlling slow oozing from raw surfaces, not by local, but by powerful systemic stimulation of the blood-clotting mechanism.

Comment

Congo red, like vitamin K, is nontoxic and materially diminishes the bleeding time. It is prompt and prolonged in its action and produces no complication, such as local slough, thrombosis, or systemic reactions. It is well-tolerated by the old and young alike and, in the series of 100 cases reported, proved highly satisfactory as a hemostatic in arresting hemorrhage from the throat.

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203½ West 8th St.

†All ampoules of Congo red used in this clinical study were generously supplied through the courtesy of The George A. Breon Company, of Kansas City, Missouri.

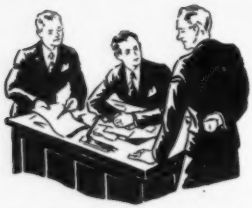
HOUSE AND HOME

There are ghosts in a home—the spirits of sadness or joy or devotion or comradeship that give each room its character and personality. It is only a trick of memory and association of ideas, but the effect is very real.

Every unkind word you speak; every petty or selfish act; every careless flash of temper; every hour of sullen resentment; every thoughtless word or deed that cuts the heartstrings of a loved one, increases the sum of unhappy memories that may finally change a home into a mere house.

A house is finished, but you keep on building a home all your life.

—ROBERT QUILLEN



GRADUATE COURSE

IX. Jaundice

The Pathologic Physiology of Jaundice

By HAROLD D. PALMER, M.D., F.A.C.P.
Denver, Colo.
Pathological and Medical Director
Denver Children's Hospital

THE term, jaundice, is applied when there is an excessive amount of bile pigment in the blood and the tissues. In the obstructive type, the bile acids are also present in the blood and tissues, but for practical purposes we think of jaundice as referring primarily to the bile pigments.

The pathologic physiology concerned in jaundice can be discussed under the headings of: formation of bile pigment; excretion of bile pigment; the re-absorption of urobilin; the clinico-pathologic types of jaundice; and hemorrhage in jaundiced patients.

Formation of Bile Pigment

This is one of the functions of the reticulo-endothelial system. One of the primary assignments of this system is phagocytosis of colloidal and particulate foreign matter from the blood stream.

In the evolution of the function of phagocytosis, we find that the ameba and similar unicellular animals phagocytose their food. In the earthworm, this function is developed in all of the cells that line the alimentary tract, but not in the outer cells. In the mammal, still further organization has taken place and the cells which line sinusoidal vascular channels in the spleen, the bone marrow, the liver, and the lymph nodes, are endowed with highly developed phagocytic power. The cells that line and form a spongy meshwork within these channels, together with certain supporting cells (the reticular cells), outside and between the sinusoids, are called the *reticulo-endothelial system*. Our present knowledge indicates that this system is concerned chiefly with (1) blood formation; (2) destruction of red blood cells and storage of iron; (3) production of immune bodies; and (4) phagocytosis of foreign particulate matter.

In discussing jaundice, we are concerned only with the function of destruction of red blood cells. Old red blood cells are phagocytosed, hemoglobin is broken down, the iron-containing portion is salvaged, and 85 percent of the iron is carried to the bone marrow and stored in the endothelial cells for future use in the production of new red blood cells. The non-iron-containing portion is the chromogen from which bilirubin is produced. Bilirubin is formed in all parts of the reticulo-endothelial system, but most of it is probably developed in the spleen. The venous blood coming from the spleen and the veins leading from the bone marrow contains a much higher content of bilirubin than do the arteries which lead to these organs, and more than the veins coming from other organs.

Excretion of Bile Pigment

Bilirubin, coming from the reticulo-endothelial (R-E) system, reaches the liver through the blood, where it is passed through the liver cells and excreted into bile capillaries. In this passage through the liver cells, a change is effected, which is portrayed by the *Van den Bergh test*. Bilirubin present in the blood *which has not passed the liver cells*, causes only an *indirect* Van den Bergh reaction. *After* passage through the liver cells a *direct* Van den Bergh reaction is obtained.

Following excretion into the bile ducts, oxidation begins and bilirubin is changed to biliverdin. Also, probably through bacterial action, a substance called *urobilin* (probably hydrobilirubin) is formed. The precursor of urobilin is called *urobilinogen*. From the small intestine, urobilin is reabsorbed to some extent. Some of the reabsorbed urobilin returns to the liver and is reconverted to bilirubin and excreted. The rest of it is excreted through the kidneys.

Clinico-Pathologic Types of Jaundice

The types of jaundice may be divided into (1) those due to excessive production of bilirubin (hemolytic jaundice) and (2) those due to failure of excretion of bilirubin (obstructive jaundice).

In *familial hemolytic jaundice* (as an example), the red blood cells are spherical in shape, rather than the normal biconcave disc. These *spherocytes* are recognized as abnormal cells as they circulate through the sinusoids of the R-E system. The phagocytic cells engulf them and destroy them in great numbers. Because of this, in familial hemolytic jaundice, the rate of blood destruction is much faster than the rate of blood production, so anemia develops and an excessive amount of bilirubin is formed. The patient is jaundiced; the spleen is large; and since the concentration of bilirubin in the blood rarely reaches the renal threshold (one part in 12,000), there is *no bile pigment in the urine*. It is, therefore, called *acholuric jaundice*. The liver function is relatively normal; bile passes into the stools and they have a normal color. The Van den Bergh test is indirectly positive. In other forms of hemolytic jaundice the cause of hemolysis may be different, but the pathologic physiology is essentially the same.

Obstructive jaundice results when the common bile duct, the ampulla of Vater, or a large number of intra-hepatic branches of the main bile ducts are obstructed. This occurs with stones in the common bile duct, enlargement of the head of the pancreas, tumors of the bile duct, severe inflammation of the bile ducts (catarrhal jaundice is an example), pressure on the ducts from the outside, or in severe toxic necrosis with edema and pressure on the bile capillaries.

Since the renal threshold for bile pigment which has passed the polygonal cells of the liver is lower (1:50,000) than it is for bilirubin which has not passed the liver cells (1-12,000), the *urine* in obstructive jaundice, is *bile stained*, while in hemolytic jaundice it is *acholuric*; also, the *icterus index* reaches higher levels in the obstructive type than it does in the hemolytic form. These factors operate to cause a progressive increase in the urine bilirubin, until it reaches a maximum. In addition, since no bile passes into the intestine, urobilin is not reabsorbed and, therefore, there is an *absence of urobilin or urobilinogen in the urine*. Urobilin and urobilinogen reappear in the urine before there is much fall in the icterus index and before the stools become colored. For this reason, tests for these pigments in the urine are one of the earliest signs of recovery.

In some cases there is a combination of obstructive and hemolytic icterus. In severe hemolytic jaundice, the bile pigment is so concentrated in the bile capillaries that bile thrombi are sometimes formed, and this results in some absorption of bile which has passed the liver cells. In this case we often get the so-called *biphasic type* of Van den Bergh reaction — a strong indirect reaction and a delayed positive, direct reaction. In other cases of hemolytic jaundice caused by toxic agents, the liver cells are so poisoned that they are unable to excrete the bile pigment. This also gives the biphasic reaction.

The *icterus index*, or quantitative Van der Bergh tests, are of value in following the development and course of jaun-

CHART I

Type of Jaundice	Van den Bergh Test			Icterus Index (Normal, 3 to 6)	Urobilin and Urobilinogen in Urine
	Direct	Indirect	Biphasic		
Complete obstructive	+	+		Elevated. Level parallels degree of obstruction	Absent. Reappearance usually first sign of relief of obstruction
Incomplete obstructive	+	+		Elevated. Level parallels degree of obstruction	Present
Hemolytic	–	+		Elevated. Level parallels course	Present
Hemolytic, with partial obstruction			+	Elevated. Level parallels course	Present

dice, particularly of the obstructive type, and are simply a quantitative estimation of the amount of bile pigment in the blood serum. Except for a slight "lag," *the level of the icterus index parallels the degree of obstruction.* In *hemolytic jaundice, it parallels the rate of blood destruction.* Chart I gives the diagnostic points in tabular form.

Hemorrhage in Jaundiced Patients

Crile has stated that 34 percent of postoperative deaths in jaundiced patients are due to hemorrhage. Because of the discovery of vitamin K and its relation to blood clotting, this is no longer true. Until recently, it has long been believed that the presence of bile in the blood prevented adequate ionization of serum calcium, and that the low level of ionized calcium was the cause of bleeding. Now it is known that the presence of bile in the blood has nothing to do with the clotting process, but the *absence of bile salts* in the intestinal tract has all to do with it. This absence of bile salts prevents the absorption of vitamin K, which is necessary for the formation of prothrombin, a vital part of the clotting process.

To restore a normal clotting process in the jaundiced patient, it is necessary to determine the prothrombin activity of the blood and to furnish both vitamin K and bile by mouth, or vitamin K alone, parenterally. Success of this treatment can be determined only by repeating the test for prothrombin activity. The treatment must be continued as long as there is obstruction, even though the obstruction may have been relieved by a bile fistula, which passes the bile to the outside, so that it does not reach the intestinal tract and, therefore, the bile salts are still absent from the point where vitamin K is absorbed.

The restoration of a normal clotting process is dependent, not only upon the absorption of vitamin K, but also upon a liver capable of manufacturing prothrombin. In some cases of severe destructive liver disease there is not enough functionally intact liver tissue to synthesize prothrombin, even in the presence of adequate vitamin K absorption. This again emphasizes the necessity of following vitamin K therapy with prothrombin-activity tests before surgery is performed. *Surgery should be delayed until the clotting process is determined to be normal.*

Hepato-Renal Syndrome

In some jaundiced patients, toxic injury of the renal tubular epithelium results in superimposition of the *nephrotic syndrome.* Nephrosis complicates many diseases of toxic-infectious origin, and the development of nephrosis in the course of jaundice should have no other status than that of a complication. It is necessary to recognize and treat it, however. The manifestations of nephrosis should not be confused with those of the primary affection. Albuminuria, low serum proteins, and edema are the important signs of nephrosis. Elevation of the blood serum proteins is the primary goal in its treatment.

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Jaundice

By DAN G. STINE, M.D., F.A.C.P.
Columbia, Mo.
Prof. of Medicine,
Univ. of Mo. Sch. of Med.

DR. STINE

JAUNDICE is a symptom that may point to one of many abnormalities within the body. Its recognition depends on one's ability to observe its yellow discoloration of, first, the sclerae, then the skin.

This symptom often appears during the first days of life. The newborn child always has a polycythemia, due to the fact that the fetus has no arterial blood in its circulation, and this constant oxygen-want builds up the polycythemia, as it does in congenital heart disease.

After birth, this anoxemia no longer exists, the need for the overabundance of red cells ceases, and their excess is destroyed, oftentimes faster than the liver cells can excrete them, and the skin becomes stained.

Later in life, jaundice may be met with during many episodes when the condition of the body ceases to be normal. We find it with the onset of infectious fevers: during cardiac decompensation; in malaria; after digestive disturbances: following severe attacks of abdominal pain requiring morphine for their relief; and we find it in middle-aged and elderly people, the jaundice appearing without pain, without digestive disturbances, without preceding sickness, becoming deeper and deeper, and persisting until the death of the patient.

Jaundice is a symptom, expressive of many disease conditions, so that the chief

problem involved is the proper interpretation of the symptom — a diagnosis of the abnormality producing it.

Types

We have two major factors in the production of jaundice: first, the *retentive* type, in which there has been such a rapid destruction of the red blood cells in the body that the blood is carrying so high a level of bilirubin that the normal liver cannot excrete the amount with which it is presented, as in icterus neonatorum, familial hemolytic icterus, and the jaundice of cardiac decompensation, where the bilirubin content of the blood has been raised, due to anoxemia.

More often, we see a rise in the bilirubin content of the blood appearing at a time when the liver cells are damaged, both conditions often being due to the same disease process. For instance, where the red cells of the body are destroyed by hemolytic poisons, as in epidemic influenza, pneumonia, and streptococcic infections, and in the jaundice of such hemolytic anemias as pernicious anemia, splenomegalic hemolytic anemia, and sickle-cell anemia, where hepatitis accompanies the increase in red cell destruction.

Second, jaundice can also be caused by the inability of the bile to flow from the bile ducts into the intestinal tract. This is *obstructive jaundice*, and there is a reabsorption of the bilirubin, which has passed in a normal amount to the liver cells, but is unable to escape into the intestines on account of the obstruction of the bile passages.

In the healthy liver, bilirubin alone is reabsorbed, but in the damaged liver, bilirubin plus bile salts may be reabsorbed *(regurgitant jaundice)*, which probably accounts for many of the toxic conditions observed in obstructive jaundice that are not present in retentive jaundice, such as the effect on the central nervous system and on clot formation, which is not present in retentive jaundice.

The most common form of obstructive jaundice is what is spoken of as *catarrhal jaundice*, which is probably not a disease entity, but is secondary to many other conditions. The name suggests that the chief etiologic factor is catarrhal swelling of the common bile duct. This is often true following acute gastro-intestinal disturbances, sometimes accompanied by inflammation of the bile ducts. Oftentimes, however, we have reason to suspect that a case of catarrhal jaundice is really a mild hepatitis, due to some toxic damage to the liver. *Acute yellow atrophy* of the liver is simply the same hepatitis of catarrhal jaundice that becomes worse instead of better, the picture of the onset of the two conditions being identical.

The other two common causes of catarrhal jaundice are due to obstruction, by the impaction of a stone, where the degree of jaundice fluctuates and is usually accompanied by pain, or by the pressure of a malignant growth, where the degree of jaundice is progressive and unaccompanied by pain, unless there has been previous gallbladder disease.

In determining the cause of the symptom, jaundice, we first have to determine whether it is due to retention of the bilirubin in the blood, because of the inability of the liver to absorb it, either because of its excessive amount, or because the liver cells have lost their power to excrete it, or to reabsorption from obstruction.

Oftentimes, the history of the sickness and the examination of the patient's body, will differentiate this condition. If it does not, it is helpful to know that, in the hemolytic type, the bilirubin *is not excreted by the kidneys*. If jaundice appears in the kidney during a hemolytic crisis, however high the level may be in the blood, it probably means that an obstructive factor has been superadded to the hemolytic factor.

In an ordinary case of obstructive jaundice, the bile pigment appears in the urine fairly early, although not so early as it appears in the skin.

Another useful diagnostic aid is the *Van den Bergh test*. Van den Bergh was able to differentiate the bilirubin of hemolytic jaundice from the reabsorption of bilirubin in the obstructive type, by using the well-known Ehrlich's diazo reagent. He found that the blood bilirubin in jaundice, after it had passed through the liver, gave a certain color reaction. It did not, however, give the reaction in hemolytic jaundice unless alcohol was added. The former was called the *direct reaction*, and was found in obstructive jaundice; and where alcohol was added, an *indirect reaction*, found in hemolytic jaundice.

Once having determined whether or not the bilirubin content in the blood has passed through the liver, then comes the problem of identifying properly the agency that is causing too great a destruction of red cells in the body, or, in obstructive jaundice, the mechanical

agency that is interfering with the proper flow of bile into the intestinal tract.

A detailed analysis of all these factors would be too voluminous for this present article.

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Roentgenologic Aspects of Jaundice

By HAROLD SWANBERG, M.D., *and* WALTER KATZ, M.D., *Quincy, Ill.*

DR. SWANBERG

OF WHAT diagnostic help can the roentgenologist be to the patient suffering from jaundice? This question is somewhat difficult to answer, because jaundice is not a disease, but a symptom with a varying etiology and significance.

Types of Jaundice

Perhaps the best and most workable classification of jaundice is the one proposed by McNee:[1] (1) Obstructive (hepatic); (2) hemolytic (splenic); and (3) toxic or infective jaundice. Obstructive jaundice comprises about 85 percent of the cases; the remaining 15 percent fall in the other two groups.

It may be due to any of the following conditions: (1) Obstruction of the ducts from *within* by gallstones, inspissated bile and mucous or parasites; (2) obstruction due to changes in the *wall* of the ducts, caused by inflammatory swelling (cholangitis) or by new growths; (3) obstructions of the ducts from *without*, by pressure from neoplasms, cysts, gummas, abscesses, etc.; or (4) kinking or torsion of the ducts due to displacement of the liver, stomach, gallbladder, etc.

A statistical analysis, made by Heyd,[2] of a large series of patients showing jaundice indicates that, according to frequency, jaundice may be classified in the following order: (1) Gallstones; (2) catarrhal jaundice (cholangitis); (3) carcinoma of the liver; (4) cirrhosis of the liver; (5) carcinoma of the bile ducts and gallbladder; (6) carcinoma of the pancreas; and (7) carcinoma of the stomach.

The *differential interpretation* of jaundice is based upon a consideration of the following diagnostic factors: (1) History; (2) physical examinations; (3) chemical examination of the blood, urine, and stools; (4) x-ray examination. The last-named in many instances, may help the clinician to arrive at a correct differential diagnosis in a patient suffering from jaundice. We will endeavor to discuss the various radiologic methods which may be successfully used to differentiate jaundice according to its etiology.

Radiologic Procedures

1. *A simple flat film of the abdomen* shows biliary calculi that consist predominately of calcium carbonate, and thus are radio-opaque (25 percent of all gallstones contain sufficient calcium to cast a shadow on a flat film). With a large *cyst* or *abscess* in the liver toward its upper and outer border, which in 15 percent of cases causes jaundice, there is a distinct *elevation of the right diaphragmatic dome*, with compression of the base of the right lung. Gessner[3] demonstrated these findings in 72 percent of such cases. In *acute yellow liver atrophy*, the liver decreases in size, falls from the anterior abdominal wall, and is replaced by intestinal loops, while the cardio-hepatic angle appears to be more acute than normal. The presence of *air* in the bile ducts and intrahepatic radicals is a characteristic sign of *biliary fistula* or *duodenal perforation*.

2. *Gastro-Intestinal Study after Ingestion of an Opaque Meal* is an indirect method for diagnosing a *neoplasm of the head of the pancreas*. The classical sign is enlargement of the duodenal curve, with downward displacement of the antrum and pylorus. In a *tumor of the body of the pancreas*, the stomach will be displaced upward and forward and the transverse colon will show a large downward impression. A constant *concave* impression in the duodenal bulb may reveal an enlargement of the gallbladder (hydrops) which, in turn, may be the cause of jaundice (pressure on the bile ducts from without). *Esophageal varices* accompanying liver cirrhosis can be demonstrated by this method.

3. *X-Ray Examination by Pneumoperitoneum* is used to visualize the outlines of the liver and to demonstrate the pancreas. Hesse[4] and others have been able to confirm the clinical diagnosis of neoplasm of the pancreas in many instances.

4. *Hepatography:* Oka,[5] in 1928, and Radt, in 1929, first demonstrated the liver by the intravenous injection of thorium dioxide solution (Thorotrast). Yater and others[6] give the following reasons for the value of hepatography: (1) To

determine the nature of a mass in the right upper abdomen; (2) to determine the presence and kind of hepatic disease (atrophic cirrhosis, primary tumors, abscess, cyst, etc.); and (3) to determine rupture of the liver.

According to Yater and Odell,[6] there are few reactions following its use and no contra-indications have yet been established. These authors have noted no histopathologic damage to the liver, but reports in the literature indicate that this diagnostic procedure may cause liver damage. Buckstein[7] and others have come to the conclusion that, since thorium dioxide is radio-active and has a long life cycle, "the substance should not be injected into human beings because of failure of elimination from the body."

5. *Cholecystography*, developed by Graham and Cole, is the most useful and revealing examination in nearly all patients suffering from jaundice. In many instances it helps to determine the type of jaundice and to differentiate its etiology. A radio-opaque dye—tetraiodophenolphthalein—is administered, either orally or intravenously, after adequate and thorough preparation of the patient, whose close cooperation is essential during the whole procedure. The roentgenologic results thus obtained are reliable, as statistics of many hundreds of cases, many of them confirmed by operation, have proved.

The main question is, whether it is feasible that the dye be administered to the jaundiced patient. Formerly the general opinion of clinicians and roentgenologists was that cholecystography, in *all* cases of jaundice, was contraindicated, because of potential danger, but recent publications (Foley, Rudisill, Foote and Carr, Delp, and others) state that, in no instances, have unusual reactions or an increase in symptoms been observed following the administration of the dye. Foley[8] and Ottenberg[9] state that this former impression, prohibiting cholecystography in jaundice, resulted from experiences with the precursors of dyes used at present and from faulty technic.

The next important question is, what exact and useful information can we expect to obtain from a cholecystographic examination in a jaundiced patient?

It would seem obvious that any pathologic process that disturbs the normal excretory mechanism to such an extent that enough bile pigment regurgitates into the blood stream to cause clinical jaundice, would prevent the administered dye from visualizing the gall bladder. But, as a matter of fact, many exact and comprehensive publications prove that, in many patients with a markedly elevated icteric index and fully developed jaundice, a clear visualization of the gallbladder can be obtained.

Rudisill[10] reports 10 patients with jaundice, in 7 of whom a positive cholecystogram was obtained. All these patients had catarrhal jaundice. In one case, in spite of a common duct stone, a gallbladder filled with stones was distinctly visualized. Foley,[8] in 1935, examined 29 jaundiced patients at the Cook County Hospital. In 11 of 16 (68 percent) with nonobstructive jaundice (intrahepatic or simple catarrhal jaundice), he obtained a satisfactory cholecystogram; whereas in the remaining 13 patients with true obstructive jaundice (extrahepatic), due to stones or neoplasm, the gallbladder was not demonstrable. Jacobi[11] obtained positive cholecystograms in 7 out of 8 cases of toxic hepatitis.

Conclusions

From these studies we may draw the following conclusions:

In complete, true *obstruction* of the bile ducts (extrahepatic jaundice), cholecystography will be negative; whereas in many cases of intrahepatic or *simple catarrhal jaundice*, the gallbladder *may* be well visualized. This will depend upon the amount of undamaged functioning liver cells which are able to excrete sufficient dye to make the gallbladder visible.

Thus, the main diagnostic value of the cholecystographic method is to differentiate the intrahepatic or medical jaundice from the extrahepatic or surgical jaundice. Most of the extrahepatic obstruction cases require surgical intervention, while intrahepatic jaundice probably never does. We think that the summary made by Delp[12] covers the essential factors of this subject.

"Cholecystography should not be considered contraindicated in patients with jaundice. Our patients showed no ill effects following the use of the dye intravenously. Examination of the current literature indicates that, in spite of opinion to the contrary held by some roentgenologists, clinicians, and surgeons, there is conclusive evidence to substantiate the belief that cholecystography does not seriously affect a patient with jaundice. It also seems clear that the gallbladder fills with the dye in a fairly high percentage of patients with non-obstructive jaundice, but does not fill in the obstructive type.

"Cholecystography should have a more frequent and wider application. The evidence of aid in the differential diagnosis may be indirect, but still a well-filled gallbladder shadow, in the presence of deep jaundice, may be the only positive sign indicating hepatitis, rather than an obstructive lesion. It is a definite aid in the difficult differential diagnosis of the patient with icterus."

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W.C.U. Bldg.

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Jaundice and the Surgeon

By WILLIAM Y. LEE, M.D.,
Philadelphia, Pa.
Lecturer in Surgery
Hahnemann Med. Coll.

WHILE jaundice is a symptom which manfiests itself to the physician as an excessive amount of bilirubin in the blood, to the patient it is a change in the color of the skin, conjunctivae, sclerae, and mucuous membranes, caused by some liver upset.

In an attempt to determine the origin of icterus, the patient must be interrogated intelligently as to its onset, its possible association with pain, its duration, its intensity, and its constancy. A careful history having been elicited, palpation and percussion of the abdomen for an enlarged liver, spleen, gallbladder, or tumor (intra- or extraperitoneal) is of paramount importance.

According to McNee, there are three types of icterus: (1) *Hematogenous*, usually found in the young and causing damage to the liver cells; (2) *hemolytic or toxic*, including congenital hemolytic icterus (splenectomy is successful in this type); (3) *obstructive*, usually occurring in middle life and caused by calculi in women and by some type of neoplasm in men. Surgery can offer permanent or palliative results.

The subject of this discussion will be the obstructive or mechanical group, which produces extrahepatic jaundice by stone, tumor, or stricture. Biliary calculi are the underlying cause in 25 percent of these cases; malignant tumors in 30 percent; and other conditions account for the remaining 45 percent.

Prior to discussing mechanical icterus, it will be in order to mention the functions of the liver, which are surgically of utmost direct interest in conjunction with causes of the symptom under consideration. These are: (1) *protein metabolism;* (2) *carbohydrate metabolism;* (3) *fat metabolism;* (4) *formation of fibrinogen and coagulants of the blood;* (5) *bile formation;* and (6) *destruction of red blood cells.*

Stones

Calculi may be present in the gallbladder (70%); cystic duct; common duct, lower portion (4 to 6%); hepatic ducts, or pancreatic duct, and are found chiefly in women. Cholesterol stones are most common.

Obstructive jaundice occurs when stones are found in the common or hepatic duct, but may be due, secondarily, to a stone in the gallbladder or cystic duct, causing pressure on the common duct. A *small* gallbladder is usually found with a stone or stones in the common duct (Courvoisier's Law). The stone may occlude the pancreatic duct and cause pancreatitis.

The pain of stone in the common duct is similar to that of gallstone colic, except that, in the former, pain is *constant*, and is followed by nausea, vomiting, and jaundice within from 36 to 48 hours. Chills may precede the fever of the intermittent variety (Charcot's hepatic fever), which is *intermittent*, on account of the ball-valve action of the stone.

Urobilinogen is present in the urine in large amounts, but not permanently. The rise of the serum bilirubin level is *transient*, in comparison with that of cancer of the head of the pancreas, wherein this change occurs. *Acholic stools*

are found following an attack of colic which is not permanent.

Cholecystectomy is the indicated surgical procedure in *cholecystitis* with *cholelithiasis*, and should be performed even with stones in the cystic duct; but when stones are found in the common or hepatic duct, cholecystectomy or *cholecystostomy* may be proper, with a *choledochostomy*, using a "T" tube or a catheter, after the stones have been removed. *Every common duct should be opened and explored when it is larger than normal or when small stones or sand have been found in the gallbladder or cystic duct or both.*

The choledochostomy tube may be removed only after (1) jaundice has subsided; (2) the tube has been clamped for from 10 to 15 days, with no bile leakage or distress to the patient; (3) a cholangiogram has revealed the return of the duct to its normal size and the absence of stones or other obstruction; and (4) the injected dye enters the duodenum in 15 minutes.

Should a stone be demonstrated, ether may be injected through the "T" tube, in order to dissolve the stone, as suggested by Pribram; otherwise it is necessary to explore the duct again. If there is an accompanying pancreatitis, the "T" tube should be allowed to remain in the common duct for one or two months, until the presence of amylase and lipase are noted and bacterial cultures are negative.

Tumors

Gallbladder

Benign tumors of the gallbladder rarely produce symptoms, but are found at surgical intervention. The most common type is the *papilloma*, but others have been reported, such as lipomas, fibromas, adenomas, myxomas, and myomas.

Malignant tumors of the gallbladder occur in from 1 to 3 percent of individuals operated upon for gallbladder disease. Carcinoma, which is found mostly in women after the sixth decade of life, extends rapidly to the liver, the regional lymph nodes, and the nodes in the portal fissure and in the lesser omentum. In these cases, obstructive jaundice results from compression of the common duct, and not from hepatic metastases. The diagnosis of carcinoma of the gallbladder is extremely difficult to make, since it mimics every pathologic process of the biliary tract.

Removal of the gallbladder is not a satisfactory treatment in these cases, as most patients die within from six months to a year after cholecystectomy, despite occasional cases that have been reported as having lived longer.

Bile Ducts

Benign tumors of the bile ducts are just as rare as those found in the gallbladder. Papillomas, found most often in the gallbladder, are also most frequently encountered in the ducts. However, adenomas, adenofibromas, fibromas, and lipomas have been found and neuromas have been reported by Walters and Comfort, and Shapiro and Lifvendahl. The benign tumor is removed, and a *choledochoduodenostomy* or an end-to-end anastomosis is performed.

Carcinoma of the bile ducts is found mostly in men, and occurs at the juncture of the cystic, hepatic, and common ducts. The most common growth is of the annular variety. The patients usually have increasing jaundice, loss of weight, and chills and fever, much like patients suffering from carcinoma of the head of the pancreas. Cystic duct carcinomas are more amenable to surgery than those of the hepatic and common ducts.

Ampulla of Vater neoplasms are usually adenocarcinomatous, beginning with pain followed by jaundice, which persists unless the tumor sloughs. Crohn has shown that gross blood, found in the duodenal contents, is suggestive of neoplastic ampullary obstruction. The liver increases in size, becoming heavily stained with bile, and the gallbladder becomes distended, clearly bearing out Courvoisier's observations.

Surgery of ampullary neoplasms is formidable; yet some of the growths are resectable, despite the high mortality (35 to 45%). *Cholecystogastrostomy* is usually performed as the first surgical step, and later the tumor is removed. Whipple's two-stage operation is a severe procedure for patients who are so severely ill.

Carcinoma of the Head of the Pancreas

Neoplasms of the pancreas are usually confined to males beyond 55 years of age, their incidence being between 0.9 and 5.3 percent. The most common type is the cylindrical-cell adenocarcinoma. These tumors grow rapidly, compressing the common duct and producing retrograde dilatation of the bile ducts, hydrohepatosis, and obstructive jaundice. Symptoms are not too clearly marked. Pain is absent in 40 percent of cases; but in the remaining 60 percent it is usually boring in character, in the epigastrium and left hypochondrium, radiating to the left of the spine. Loss of

weight (an early sign) is followed by rapid emaciation, due to marked anorexia. Hyperinsulinism may occur. Icterus is always present, with an ever-rising serum bilirubin value. The liver becomes large and easily palpable, as is also the gallbladder in 60 percent of individuals (Courvoisier's Law). As a result of deep jaundice, an intense pruritus with acholic stools, urobilinogen in the freshly voided urine, an elevation of blood lipoids, and a marked hemorrhagic diathesis are found.

Surgery is usually palliative, because the majority of the icteric patients have not been recognized early enough; therefore, metastases are extensive, or the growth is too large. All the surgical procedures attempt to re-route the bile through either the stomach, the duodenum, or the jejunum, so that bile may again enter the intestinal tract and relieve the patient of the intense pruritus.

Cholecystogastrostomy has been performed (1) because the anastomosis can be carried out without any tension on the suture line, and (2) because the wall of the stomach is thicker and has within it a more adequate blood supply. However, in this type of anastomosis, gastric contents are occasionally found in the gallbladder and bile ducts.

Cholecystoduodenostomy is sometimes a difficult technical procedure, because of a deeply-situated duodenum and an overhanging right lobe of the liver. Furthermore, a pancreatic tumor may fix the duodenum so that it cannot be mobilized.

Cholecystojejunostomy, as advocated by Lahey, is a very satisfactory method of sidetracking the bile, and should be used more often, for it is an easy and safe procedure.

Chronic Interstitial Pancreatitis and Cysts

This condition is usually found in *younger* individuals, and produces an *incomplete* and *inconstant* jaundice, with which calculi are associated. Exclusion of pancreatic juice from the intestinal tract results in *fatty stools* and an elevation of serum lipase and amylase.

Cholecystostomy is preferred, with a "T" tube placed in the common duct. Cholecystogastrostomy or cholecystojejunostomy are valuable procedures.

Pancreatic Cysts are mostly found in the body and tail of the pancreas, and are to be located, in the epigastrium or to the left of the median line, as a fluctuating tumor. It is possible for them to cause jaundice by direct pressure on the ducts or from chronic inflammatory changes in the pancreas.

Extrahepatic Lesions Causing Jaundice

Jaundice has been caused by sarcomas of the spleen, gummas, metastatic cancer, hydatid cysts of the liver, carcinoma of the stomach involving lymph nodes in the vicinity, Hodgkin's disease, and retroperitoneal tumors of the right kidney or suprarenal gland.

Strictures

Strictures may be congenital, inflammatory, or traumatic. The last group can be due to either anatomic anamolies or surgical misfortunes.

I. *Congenital obliteration of bile ducts* is found in children and, according to Ladd, should have surgical treatment between the second and the fourth month, with either a choledochoduodenostomy (preferred) or a hepaticoduodenostomy.

II. *Choledochus cysts* are extremely rare, but are treated by means of a choledochoduodenostomy.

III. *Common bile or hepatic duct strictures.*

1. *Primary inflammatory strictures:* The infection, which resembles a cancer of the ducts, involves the walls of the ducts, resulting in cholangitis with biliary cirrhosis.
2. *Secondary inflammatory strictures* may be caused by calculi, with infection in the cystic duct. According to Walters, the strictures are limited to the pancreatic portion of the common duct.
3. *Traumatic strictures* are most common, and are associated with deep jaundice, cholangitis, and marked liver injury. The liver is tremendous, firm, and deep-green in color. They may result from:

A. *Anatomico - pathologic processes.*

a. Short or long cystic ducts, the latter running parallel to the common duct.

b. Relationships of the cystic artery to the ducts.

c. Extension of infection from gallbladder to ducts.

d. Distortion of Hartman's pouch by infection between the cystic and common ducts.

B. *Operative misfortunes.*

a. Pressure of a drain on the common duct.

b. Necrosis from a snug-fitting "T" tube.

c. Ligation of the cystic or common duct or of both, with sectioning of the distal portion of the

common duct on removing the cystic duct.

d. Inflammation surrounding the common duct, from a cystic-duct leak.

Hepatic insufficiency must be treated with vitamin K (1 mg. four times a day—q.i.d.) and bile salts (10 grains q.i.d.), in addition to a diet consisting of 20 percent protein, 75 percent carbohydrate, and 5 percent fat, as suggested by Ravdin.

In surgery of strictures of the ducts, it is important to establish a *permanent external biliary fistula* or a *hepaticoduodenostomy*, as a life saving procedure. It may be possible to perform a cholecystoduodenostomy, if the gallbladder is present, a choledochoduodenostomy, a hepatoduodenostomy, or an end-to-end anastomosis of the ducts. These surgical procedures carry with them a mortality rate of from 10 to 15 percent, which may be due to (1) duodenal fistula; (2) leakage of bile; or (3) intestinal or local hemorrhage.

Diagnosis

Limited information is gleaned from liver function tests, which are of definite value only at the time they are made and in cases of early jaundice. It is important to remember that, even though 60 percent of the liver is destroyed, all functions can be normal. However, procedures which have proved themselves useful are as follows:

1. The *Icterus Index* is used to determine whether the amount of bilirubin in the blood is better, worse, or unchanged.

2. The *Hippuric Acid Test* is supposed to determine the extent of liver injury excluding cirrhosis, but is not accurate when renal insufficiency is present. Walters and Snell found that reduction of 50 percent or more in excretion of hippuric acid is indicative of marked hepatic cellular damage and is of grave prognostic significance if surgical relief of obstruction is indicated.

3. The *Quick method for the determination of blood prothrombin* is excellent and should be used oftener. Recently the *Ivy Bleeding Time* and the *Serum Volume Index* of Boyce and McFetridge have been checked against the Quick method, by L. K. Ferguson, and found to compare favorably. Incidentally, these two latter tests are easier to perform.

If the prothrombin content of the plasma is low in a jaundiced patient, the condition is evidence of liver damage, yet liver damage may exist without the prothrombin being lowered abnormally. It is always better to suspect a patient with biliary tract disease of having a low prothrombin level, and treat him on that basis.

The following points relating to diagnosis are presented for what they are worth:

1. The *serum cholesterol ester determination* is increased in obstructive jaundice.

2. The *urobilinogen determination in feces*, according to Watson, is helpful in differentiating stone from cancer. Calculi should show 10 mg. in 24 hours in the excreta, while cancer shows 5 mg. in 24 hours.

3. The *serum lipase determination* may show low, normal, or high lipids in pancreatitis or carcinoma.

Furthermore, the peritoneoscope can be of value in determining the size of the gallbladder (Courvoisier's Law), the size of the liver, and the presence of metastases in the liver or other abdominal viscera. Compound Diodrast can be injected, under direct vision, into the gallbladder, and cholecystograms can be taken both prior to and after the administration of a fatty meal.

Treatment

The preoperative and postoperative care of the jaundiced patient is of paramount importance. It must be remembered that, prior to the use of vitamin K and bile salts, postoperative bleeding occurred in jaundiced patients between the fourth and tenth day. In a recent survey, Rhoads pointed out that, prior to the use of vitamin K, the hemorrhagic tendency in obstructive jaundice accounted for about 50 percent of surgical mortality. Since the use of vitamin K, the hemorrhagic diathesis death rate has been reduced to between 5 and 10 percent.

The hemorrhagic diathesis must be treated vigorously with vitamin K and bile salts, until the prothrombin time is within normal limits, prior to operation, and should be followed closely for at least twelve days postoperatively, or until such times as the wound is healed or the plasma prothrombin has attained normal levels. The prothrombin time should be tested daily for six days, and then every other day until the twelfth day postoperative.

A complete lack of vitamin K rarely occurs. Klotogen, 1 mg., with bile salts, gr. x, q.i.d., should be given orally, and the prothrombin time watched carefully. These remedies may be given

through a duodenal tube, or vitamin K subcutaneously, as Synkamin, until the patient can tolerate Klotogen and bile salts orally.

Intravenous infusions of dextrose (2000-3000 cc. of a 5% solution in physiologic saline) should be administered daily, pre- and postoperatively. Ravdin has shown that dextrose is used for rapid energy production, and is not deposited, and that a high lipid content of the liver is possible after several days of its administration. The only means of displacing the liver lipid is by use of protein. Ravdin found most valuable a pre- and postoperative diet of from 2500 to 3000 calories, divided as follows: carbohydrates, 70-75%; proteins, 20-25%; and 5% fat.

It is advisable to use blood transfusions after operation. This blood should be *fresh*, because the longer it stands, the less prothrombin is present, as Rhoads and Panzer reported.

Vitamins play an important part in all jaundiced patients, where there is always liver damage. Vitamin B complex may be administered as brewer's yeast tablets (Mead), three tablets three times a day (t.i.d.). Vitamin C may be given as orange juice, from 4 to 6 ounces t.i.d., with vitamin C (ascorbic acid), 50 mg. t.i.d., preoperatively, and 100 mg., subcutaneously, t.i.d., postoperatively until oral feedings are tolerated.

Summary

Careful preparation of the patient for surgery in obstructive jaundice, and careful post-operative treatment, are essential.

The end-results of surgery of the biliary tract necessitated by stone, stricture, or tumor may be palliative or curative, by utilizing any of the following procedures: Cholecystogastrostomy, cholecystoduodenostomy, cholecystojejunostomy, choledochoduodenostomy, hepaticoduodenostomy, cholecystostomy with choledochostomy, hepatoduodenostomy, an end-to-end anastomosis, or combinations of these.

1113 Medical Arts Bldg.

Simple Postoperative Care*

Postoperative complications should be prevented, whenever possible, by these measures:

Pneumonia and atelectasis are prevented by (1) having the patient take deep breaths every hour while morphine is being used postoperatively; (2) the patient's position should be changed every two hours; (3) all tension should be kept off the incision by keeping the knees partially flexed and the head slightly elevated, while the patient is on his back, and by seeing that a pillow is placed between the knees when he is on his side; (4) the respiratory rate should be watched closely as long as the patient is receiving morphine; and (5) oxygen should be given at once if dyspnea or cyanosis appears.

Ileus and "gas pains" are prevented by the routine use of Pitressin in all cases liable to have later ileus, and by immediate feeding of soft or semisolid foods (the night of operation or the morning following). Wangensteen suction should be used at the first sign of distention or repeated vomiting, or immediately after operation if ileus is feared. Patients may be fed even if nauseated, as food makes them feel better.

Catheterization should be employed every 8 hours, as this makes the patient much more comfortable and the bladder is spared from overdistention, atony, and consequent lowered resistance to infection.

It is better practice to prepare the patient well with intravenous injections of fluids or a blood transfusion preoperatively, rather than to make them emergency procedures after surgery. Do not give long intravenous injections, as they upset the patient. Get the patient out of bed as soon as possible. Patients who have had radical removal of a breast should be ambulatory at all times, and should be encouraged to comb their hair with the arm on the affected side, so that later stiffness and edema will be prevented.

B. C. Barnes, M.D.

Des Moines, Ia.

*Presented before the Broadlawns Hospital Friday Morning Clinic, Des Moines, Ia., Jan. 16, 1942. Reported by R.L.G.

CLINICAL NOTES and ABSTRACTS

Microfilm copies of any of the published papers here abstracted, up to 25 pages, may be obtained for 25 cents from Microfilm Service, Army Medical Library, Washington, D.C.

Procaine Injections and Myalgic Spots

THERE are two main objects in procaine injection treatment as it affects the rheumatic patient. The first and most usual is for the relief of *pain*, and the second for the relief of *muscle spasm*, which is not necessarily painful. There is certainly the acute painful spasm of a lumbago, but also the chronic, usually painless, adductor spasm of osteoarthritis of the hip joint. Both of these may gain a marked relief by the injection of 20 cc. of 0.5-percent procaine in saline solution into the belly of the affected muscle. One may expect the immediate relief of an acute lumbago, whilst a greater power of abduction gives considerable comfort in movement to the sufferer from osteoarthritis of the hip.

This procedure is quite different from that for the relief of chronic rheumatic pain. Here the injection of socalled *myalgic spots* (M.S.), detected by palpation, yields excellent results. The M.S. are invariably *proximal to the pain*, when this is felt in the limbs. Thus pain in the hands may be due to M.S. in the elbow region (see Fig. 1);

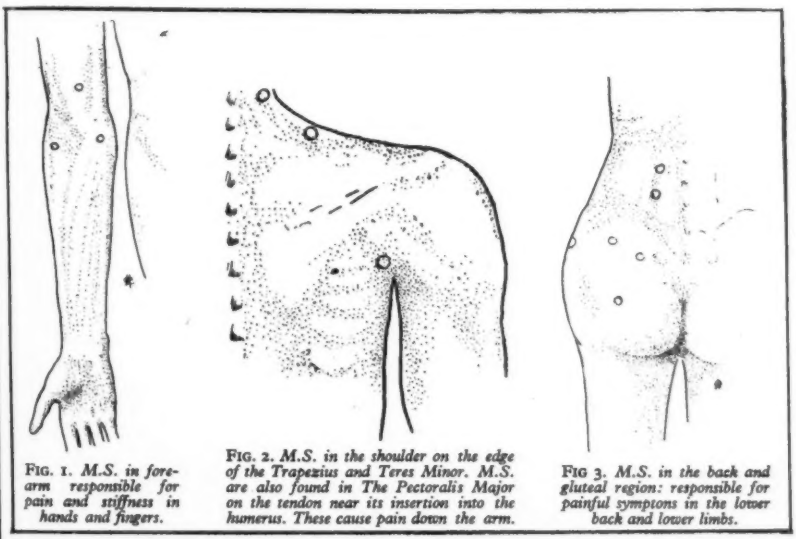

FIG. 1. *M.S. in forearm responsible for pain and stiffness in hands and fingers.*

FIG. 2. *M.S. in the shoulder on the edge of the Trapezius and Teres Minor. M.S. are also found in The Pectoralis Major on the tendon near its insertion into the humerus. These cause pain down the arm.*

FIG 3. *M.S. in the back and gluteal region: responsible for painful symptons in the lower back and lower limbs.*

pain in the arms is usually due to M.S. in the shoulder girdle (see Fig. 2); pain in the legs in referred from M.S. in the back, buttocks, and down the thigh (see Fig. 3).

To detect the spots, firm digital pressure is made on the usual areas, now fairly well known. When this pressure is applied to M.S. the patient cannot avoid wincing. *This is pathognomonic.* All spots so found can be marked by a swab moistened with iodine. There may be two or three or a larger number. A half-percent solution of procaine in freshly made physiologic saline is prepared. A convenient method of doing this is to have the saline solution sterilized and put up in a rubber-capped, 6-oz. (180 cc.) medicine bottle, and 50 or 100 cc. of 5-percent procaine, also in a rubber-capped bottle. Then, for a 10 cc. syringe, draw up 9.5 cc. of saline and 0.5 cc. procaine solution, and mix them. For a larger syringe, of course, in proportion.

A sharp, fine 2½-inch needle should be used. This is inserted into the skin and pushed down on to the area of acute tenderness. The point of the needle is used as a probe to find the M.S. When the exact spot is located by the needle point (and there is no doubt about it, for the patient, however stoical, will again be unable to suppress a wince), 1 cc. is injected. The diagrams show the places where M.S. are likely to be found.

Before treatment, a note should be made of some disability. There may be pain alone, or this may prevent full movement of the arm, leg, or back, as the case may be. Immediately after the injection the pain should have completely disappeared and full movement been regained. If this has not occurred, and until it does, search should be made for further M.S.

After treatment, when the anesthetic effect has worn off, the pain, for a day or two, may be worse. The patient should be warned. Then should follow great relief. If this is not complete, further injections may be given after a week or less. At this second examination, the injected spots will no longer be tender, but others will be found in much the same areas. It is seldom that the injection treatment has to be repeated more than twice.—*Rheumatism: Wartime Bulletin* (London), Dec., 1942.

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My father is an old time subscriber to CLINICAL MEDICINE and your publications have been in our family longer than I.
—L.W., R.N., Calif.

Amino Acids in Surgery

In surgical cases, an adequate supply of protein is highly important, to protect the liver from possible toxic effects of anesthesia; to prevent tissue edema, which interferes with healing; and to supply essential nutrients for tissue repair and regeneration.*

Solutions of amino acids† were given by mouth, intravenously, and intrasternally,‡ as the only source of nitrogen before and after operation, in cases of poorly-healing surgical wounds, ulcers, and burns, and healing was definitely stimulated. Moreover, the disabling symptoms of muscular dystrophies were relieved while patients were receiving these solutions.

The daily dose of the solution containing 15 percent of amino acids (2.1 percent nitrogen) was from 200 to 400 cc., and was generally diluted with 2 or 3 parts of 5- or 10-percent dextrose solution. If the gastrointestinal absorption was good, it was equally effective in whichever of the three ways it was administered. When given by mouth it was diluted with fruit or tomato juice.

Infusions into the bone marrow, using Turkel needles, are a great help when the veins are inaccessible. — SAMUEL S. ALTSCHULER, M.D., *et al.*, in *J.A.M.A.*, Jan. 16, 1943.

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Treatment of Nail Wounds

Nail wounds, and other punctured wounds, are best treated thus: (1) All superficial dirt in the vicinity of the wound is removed by scrubbing with green soap and water, followed by cleansing with ether and alcohol, to remove any grease or oily dirt from the skin; (2) the area is dried and painted with tincture of Merthiolate; (3) the wound edges are then infiltrated with 2-percent procaine solution (the needle is pushed in just beneath the skin edges so that no pain is experienced, such as occurs when the needle is passed into intact skin), sufficient to produce anesthesia for one-half inch on all sides and to the depth of the wound; (4) for the small, smooth puncture, a simple incision is made, just large enough to expose the tract for inspection; (5) particles of rust or other foreign material are removed mechanically, with sterile forceps, or by irrigation with hydrogen

* Vitamins C and D should be added in these cases.—ED.
† Supplied by Frederick Stearns & Co., Detroit.
‡ See article by Tocantins in CLIN. MED., Aug., 1942, p. 220.

peroxide or saline solution, (6) the large or lacerated wound, with ragged edges, is treated by an elliptical incision on each side, sufficient to remove the infected tract, and the same cleansing processes are carried out. This results in a wound which heals from the bottom.

When the wound is clean, a small wick of iodoform gauze is inserted to the bottom, and a boric acid-ointment dressing applied. Tetanus antitoxin (1500 units) is given, unless the patient is sensitive to horse serum. The patients are allowed to keep on working.

This treatment for such a common injury may seem radical, but the sight of just one patient with cellulitis of the foot, or with tetanic convulsions, following a puncture wound that was hardly visible to the eye, is enough to indicate its value. The resulting wounds are small and heal rapidly.—L. J. Netto, M.D., in *South. Med. J.*, Aug., 1942.

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Look for THE LEISURE HOUR among the advertising pages at the back.

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Sulamyd in Urinary Infections

In our series of 135 patients with urinary infections, there were 110 men and 25 women; 77 individuals were over 60 years of age; 59 suffered from infections complicated with cancer, uremia, stone, obstruction, or abscess; while 42 had septic processes following prostatic and bladder surgery. These factors should be considered in the final interpretation.

Results in uncomplicated infections	Acute	Chronic
Excellent	78.5%	50.0%
Good	14.4%	14.8%
Failure	7.1%	35.2%

Results in complicated infections	Acute	Chronic
Excellent	71.8%	14.9%
Good	21.3%	22.2%
Failure	6.9%	62.9%

All medication was given orally. The most common dose was 1.5 Gm. of Sulamyd (Schering) 4 times daily, although doses ranged from 2 to 10 Gm. daily; from 10 to 15 grains (0.6 to 1.0 Gm.) of sodium bicarbonate were given with each dose of Sulamyd. Blood levels of the drug ranged from 2.0 to 15.4 mg. percent.

There were no severe and relatively few mild toxic reactions. In 5 patients cyanosis developed; mild decreases in hemoglobin and red-cell count were noted in 4 patients; moderate leukopenia developed in 2 individuals.

The character of the invading organism did not significantly alter the result, the drug being effective against cocci and bacilli. In general, more favorable results were noted in younger patients. The use of Sulamyd in the urinary tract infections of children produced uniformly good results without toxic effects. Results with mixed infection were good—80 percent of when the combination included *Staphylococcus aureus* or *albus*.

—Drs. Robert J. Prentiss and John F. Kanealy, in *J. Urol.*, Jan., 1942.

✦

Bismuth in Tonsillitis

The administration of bismuth, either orally, rectally, or intramuscularly, results in the prompt symptomatic relief and objective improvement of acute tonsillitis. Sobisminol mass* is given in doses of four or five capsules (orally or rectally) during the first day, and three capsules the following day; children receive three capsules the first day and two the second day. Pain on swallowing subsides within eight hours, and fever disappears and the throat looks almost normal in 24 hours.

Bismuth therapy is effective against Vincent's agina, acute pharyngitis with exudate, tracheal fusospirochetosis, and a few cases of resistant cough due to tracheitis. It has no effect on pharyngitis, acute or chronic.—J. Berberich, M.D., in *Med. World*, Jan., 1943.

✦

Sulfonamides in Skin Diseases

The local use of sulfathiazole powder and 5- to 10-percent sulfathiazole ointment is of value in the treatment of localized pyogenic infections (impetigo, folliculitis, acne).

Sulfathiazole therapy cures or improves patients with erysipelas, lymphogranuloma, chancroid and chanroidal bubo, ecthyma, impetigo, non-specific inguinal adenitis, non-specific penile ulcers, lymphangitis associated with ringworm, varicose ulcers (sulfathiazole powder), and gonorrheal urethritis and cervicitis.

Sulfadiazine apparently gives as good results with far less frequent toxic reactions. Oral administration of the sul-

*Eli Lilly & Co., Indianapolis, Ind., manufacturers.

fonamides should be used only in generalized pyogenic infections. The most frequent reactions are fever, bilateral conjunctivitis, and dermatitis (erythema, urticaria, nodules, papules, acne, angioneurotic edema).—S. E. LANDY, M.D., in *N.Y.S.J.M.*, Dec. 15, 1942.

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Fractured Metatarsals

A fracture of the metatarsal bones is usually caused by objects falling on the feet. The usual treatment has been a plaster boot, worn for from 3 to 5 weeks, followed by protective weight bearing for 2 to 3 weeks.

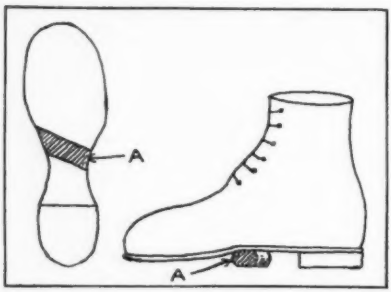

Fig. 1: Bar shown at A.

A *new method* may be used in fractures involving up to 4 metatarsals, since at least one is needed to hold the foot in position.

A transverse bar is placed under the shoe in a slightly oblique position, in the direction of the metatarsal heads, 1½ to 1¾ inches in front of the heel (see Fig. 1). Having the patient bear his weight on the foot in a shoe, over a broom handle, the proper location for the bar is at that point in front of the heel where there is practically no pain on weight bearing. The bar must be high enough so that the ball of the foot will not touch the floor.

An ideal bar can be made from a section of an oak or maple hoe or rake handle, just the length of the width of the shoe at the point in front of the heel where it is to be placed. One side of the block is flattened by simple carving. Two drill holes are made through the shoe from within, into the block, and the block is screwed to the shoe from the inside with flathead screws. After the bar is in place, it may be carved with a knife to provide uniform weight bearing, which is begun as soon as the patient is able to get a regular shoe on the injured foot (usually 1 week), and he is returned to work. The bar-shoe is worn, *at all times*, for 6 weeks. X-Ray films show results to be good. —U. E. GEBHARD, M. D., in *South. Med. & Surg.*, Sept., 1942.

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Tube Feeding Diet

This formula may be used for "tube" feedings: In 24 hours, the patient is given 3 eggs, 12 cups of evaporated milk, ¼ pound of sieved liver, 5 tablespoonfuls of salad oil, ½ cup of pureed vegetables, 1½ cups of mashed potatoes, ½ cup of molasses, ¼ cup of pureed prunes, 1 cup of cooked oatmeal, ½ cup of sugar, ½ cup of orange juice, and 1 tablespoonful of brewer's yeast. This diet supplies 171 Gm. of protein, 225 Gm. of fat, 547 Gm. of carbohydrate, 4,897 calories, and 3,000 cc. of fluid. One child was nourished on this diet alone for 13 years, and grew normally. —*Bull. Johns Hopkins Hosp.*, Oct., 1942.

◆

Reimmunization Against Diphtheria

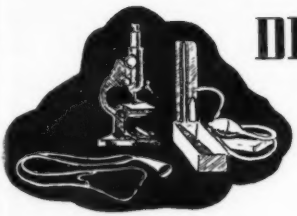
Diphtheria antitoxin immunity is not permanent, but diminishes gradually, so that, in time, it may be entirely lost. It is, therefore, a good practice to reimmunize children, 5 or 6 years after immunization in infancy, using *one small dose* (0.1 to 0.5 cc.) of fluid or alum-precipitated toxoid. In 808 children so treated there were no general allergic reactions, and the local reactions, seen in about 35 percent of cases, were not severe enough to discourage the procedure.—DRS. V. K. VOLK and W. E. BURNEY, in *A. J. Pub. Health*, July, 1942.

◆

The Bladder in Comatose Patients

The bladder, in comatose patients, may become so overdistended with urine that it remains atonic for weeks. These patients should be carefully watched and the bladder emptied before it becomes palpable. If the coma is likely to last more than 6 hours, a retention catheter should be placed and the bladder emptied every 4 to 6 hours. The use of sulfonamides,* in daily doses of 40 grains, is a valuable prophylactic against urinary infection in such cases. BARNETT A. GREENE, M. D., in *Ann. Int. Med.*, April, 1942.

*Sulamyd (Schering) seems to be the best drug for this purpose.—ED.



DIAGNOSTIC POINTERS

Low Back Pain

• In the great majority of cases, low back pain following an injury is due to partial or complete rupture of several of the ligaments of the back (attachments of erector spinae to ilium; the supraspinous, interspinous, and intertransverse ligaments). The roentgram will usually show no lesion. Injection of procaine into tender areas will relieve the pain, unless a more severe injury (such as protruded intervertebral disc) is present. — V. T. INMAN, M. D., in *Radiol.*, Sept., 1942.

Intermittent Pyuria

• Intermittent pyuria is found in pyonephrosis (and pyelitis). The attacks of blockage of the ureter are associated with fever and pain. — ALEX ROCHE, F.R.C.S., in *Med. World* (Lond.), Nov. 1942.

Kidney Function Test

• The specific gravity of the urine should be tested, as an index of the kidney function. A kidney that can concentrate over 1.020 is not damaged.—A. FISHER, M.D., in *Med. World* (Lond.), Nov., 1942.

Nosebleed

• A sudden epistaxis (nosebleed), in a man who has passed middle life, may be the first indication that he is suffering from hypertension and granular kidney. — GEORGE MURRAY, M.D., in *Med., World* (Lond.), Nov. 1942.

Chronic Nephritis

• The great danger of chronic nephritis is that some one will find it out and try to treat it, for too-energetic measures may do much harm by knocking down the patient at the same time as the blood pressure. — H. W. DICKINSON, M.D., in *Med. World* (Lond.), Nov. 1942.

Roentgrams of the Newborn

• If a child weighs more than 9 pounds at birth, hypothyroidism should be suspected. In the first 48 hours of life, the centers of ossification in the knee, lower end of the femur, upper end of the tibia, astragalus, and calcaneus should be demonstrable. *If one or more are absent, the chances are that thyroid deficiency is present.*

Persistent vomiting calls for a barium study of the stomach and intestinal tract, to rule out obstruction of the intestine.—P. J. CONNOR, M.D., in *Radiol.*, Sept., 1942.

Beriberi Heart

• Dyspnea, cyanosis, and an enlarged heart, in a baby or child, may be the only signs of a vitamin B-deficient (beriberi) heart. Rapid clinical improvement follows the use of thiamin (6 mg. daily).—H. RASCOFF, M.D., in *J.A.M.A.*, Dec. 19, 1942.

Bleeding and Uremia

• Any patient who tends to bleed on little or no provocation should be suspected of being latently uremic. —A. A. FISHER, M.D., in *Med. World* (Lond.) Nov., 1942.

Toxemia and Neurasthenia

• The patient with toxemic symptoms from a focus of infection is often diagnosed as being neurasthenic, especially if abnormal physical findings are absent. — MYERS SOLIS-COHEN, M.D., in *Med. World*, Oct. 1942.

Focal Infection

• Tiredness, especially noted in the morning after a night's sleep which seems neither refreshing nor sufficient, is a common symptom of focal infection. Apathy, lack of ambition, inability to concentrate, and an aversion to mental work, so that the patient must "drive himself" to get anything done, are often complained of. Vertigo, loss of appetite, temporary blurring of vision, or blindness may be noted. — M. SOLIS-COHEN, M.D., in *Med. World*, Oct. 1942.

• One diagnosis is worth ten haphazard treatments.—R. THOMPSON, M.D.

THUMBNAIL THERAPEUTICS

Phenobarbital and Benzedrine Sulfate in Epilepsy

• By adding Benzedrine (amphetamin) Sulfate (S.K.F.) to a phenobarbital regimen, the drowsiness and depression due to large doses of the sedative may be counteracted. The patient feels better mentally, and this psychic stimulation tends to prevent convulsions due to fear, frustration, and unrevealed compulsions. The dose of phenobarbital is gradually increased until all convulsions are prevented. Benzedrine may be given in doses as high as 30 mg. daily, preferably during the morning and early afternoon hours, so as to avoid any tendency to insomnia.—G. Cook, in *Dis. Nervous System*, Dec., 1942.

Lozenges

• A gargle never reaches much of the surface of the pharynx. It is better to use a lozenge, which contains the proper medicaments. When a lozenge is slowly dissolved in the mouth, continuous and well-distributed contact with the throat results.—*E.E.N.T.M.*, Jan., 1943.

Heart Failure and Nephritis

• A patient with cardiac insufficiency and chronic nephritis should be treated with the usual measures for cardiac decompensation (digitalization, rest, restriction of salt). The kidney findings must be ignored for the time. — Hugh McLean, M. D., in *Med. World* (Lond.) Nov., 1942.

Achlorhydria

• Painless diarrhea, which occurs on arising in the morning and after the ingestion of food, is often the result of achlorhydria, and is relieved by the administration of dilute hydrochloric acid, from 15 to 45 drops in a glass of water or fruit juice, with each meal. —H. J. Tumen, M.D., in *Northwest Med.*, July, 1942.

Artificial Insemination

• When planning to use semen from an unrelated donor, these rules should be followed: (1) The donor must remain completely anonymous to the recipient and the husband, the recipient and husband remaining equally anonymous to the donor; (2) do not carry out insemination unless the couple are fairly stable and reasonably certain to remain permanently married; (3) never urge the procedure, and if either husband or wife is lukewarm, drop the subject; (4) forget signed papers; if the patients are carefully selected, contracts and agreements are unnecessary and simply act as a permanent reminder of something that is better forgotten.—*West J. Surg., Ob. and Gyn.*, July, 1942.

Liver Extract in Myopia

• Myopia has been markedly improved, in some cases, by the intramuscular injection of liver extract (2 cc. of 5-unit extract, weekly for 10 weeks). Myopia may be due to rheumatic infection, and may be associated with rheumatic heart disease and tonsillitis. — R. D. Barnard, M. D., in *E.E.N. & T.M.*, Dec., 1942.

Intolerance to Stilbestrol

• If a patient complains of nausea and vomiting while taking stilbestrol, she should take only 0.1 mg. tablets, one daily for five days, and then increase the dose very gradually. — *South. Med. & Surg.*, Aug., 1942.

Simple Burn Treatment

• The burn and surrounding skin should be cleaned by gentle washing with white soap and water; a thick covering of cod-liver oil ointment applied with a wood applicator; and the wound covered with a single layer of ordinary, white paper tissue of the Kleenex type. Motion is encouraged, to prevent deformity. Dressings are changed as infrequently as possible. If necessary during the cleansing process, morphine or a general anesthetic may be used. — G. B. Callahan M. D., in *Ill. Med. J.*, Nov., 1942.

NEW BOOKS

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A good book is the precious life-blood of a master-spirit imbalmed and treasured up on purpose to a life beyond life.—MILTON

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CLINICAL CARDIOLOGY

Dressler

CLINICAL CARDIOLOGY, With Special Reference to Bedside Diagnosis. *By* WILLIAM DRESSLER, M.D., *Attending Cardiologist, Israel Zion Hospital, Assistant Attending Physician, Brooklyn Hospital, New York. 108 illustrations. Paul B. Hoeber, Medical Book Department, Harper and Brothers: New York, London. 1942. Price $7.50.*

At long last, a book on heart disease which gets out of the laboratory! The author writes, "Overemphasis on laboratory methods has reached a dangerous point. Electrocardiographic findings are often considered sufficient evidence on which to base a grave diagnosis and prognosis, even when clinical observation points to the contrary."

Many physical signs are presented, which can be easily obtained by anyone with sight, hearing, and tactile sensation. The important findings in the history are given briefly, and emphasis is laid on important facts thus elicited. Clinical facts are brought out in every chapter of the book, as in the differentiation of cardiac failure from peripheral circulatory failure (a distinction still not understood by many practitioners, who give heart stimulants instead of blood or plasma to increase the blood volume).

This book is written for the physician who wishes to give his patients proper diagnosis and treatment and sound advice.

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MEDICAL PARASITOLOGY

Culbertson

MEDICAL PARASITOLOGY. *By* JAMES T. CULBERTSON, *Assistant Professor of Bacteriology, College of Physicians and Surgeons, Columbia University, New York City. 285 pages; 37 illustrations. New York: Columbia University Press. 1942. Price, $4.25.*

In one small volume, the author has condensed the important facts that the general practitioner needs to know in regard to parasitic infestations. Malaria, amebic dysentery, intestinal worms, trichomonas vaginalis, black widow spider, and rarer parasitic forms and their diseases are presented in a direct manner.

Each parasite is discussed so that one can quickly learn how it gains access to the body, what symptoms it produces, how a definite diagnosis may be made, and what treatment should be employed.

It has been said that anyone can write a long book, but it takes a clever man to write a short one.

NASAL MEDICATION

Fabricant

NASAL MEDICATION, A Practical Guide. *By* NOAH D. FABRICANT, M.D., M.S., *Associate in Rhinology, Laryngology, and Otology, Univ. of Illinois College of Medicine. Baltimore: The Williams and Wilkins Co. 1942. Price, $2.50.*

Few textbooks give the treatment of nose and throat disorders adequate discussions of the methods of administering medical treatment in and through the nose, but Dr. Fabricant has covered the field rather fully, including the anatomy and physiology of the nose and its accessory sinuses; the effects of drugs on these structures and functions; methods of applying nasal medication (including the Proetz displacement technic, tampons, sprays, etc.); and the use of these medications in disease and in children.

The author's views are thoroughly conventional and the older methods are well described, but most of the newer ones are omitted. A reasonable number of illustrations are used.

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WAR MEDICINE FOR CIVILIANS

Darnall & Cooper

WHAT THE CITIZEN SHOULD KNOW ABOUT WARTIME MEDICINE. *By* JOSEPH R. DARNALL, M.D., *Lt. Col., Med. Corps, U. S. Army, and* V. I. COOPER. New York: W. W. Norton & Co. 1942. *Price, $2.50.*

Civilians and laymen are entitled to know what the Medical Departments of our Army and Navy are doing and trying to do for our fighting men. This book will tell them, in language they can understand, and should clear up many hazy and foolish conceptions. It describes the organization of the medical departments, and tells what is being done in aviation medicine, military psychiatry and sanitation, immunization, venereal disease control, and other lines. The authors speak with authority, and young medical officers may find it helpful in showing them the Big Picture, of which they see only a small part.

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THE HAND

Cutler

THE HAND: Its Disabilities and Diseases. *By* CONDICT W. CUTLER, JR., M.D., F.A.C.S., *Associate Surgeon, Roosevelt Hospital; Director of Surgery, Welfare Hospital; Consulting Surgeon, New York Dispensary. 274 illustrations. Philadelphia and London: W. B. Saunders Company. 1942. Price, $7.50.*

Every condition which may affect the hand —infections, deformities, tumors, manifestations of systemic disease, and endocrine disorders—is considered in this monograph. Such a mode of presentation is clinically valuable, because the physician need not look through medical and surgical texts concerning any lesion of the hand.

This book is written primarily for the general practitioner, because it is he who sees the great majority of hand injuries and infections and it is he who can do so much to decrease disability by making the correct diagnosis and starting proper treatment.

The only suggestion for improvement of the work would be the inclusion of step-by-step illustrations of certain operative procedures and photographs of less common diseases. In the next edition, these may be readily inserted.

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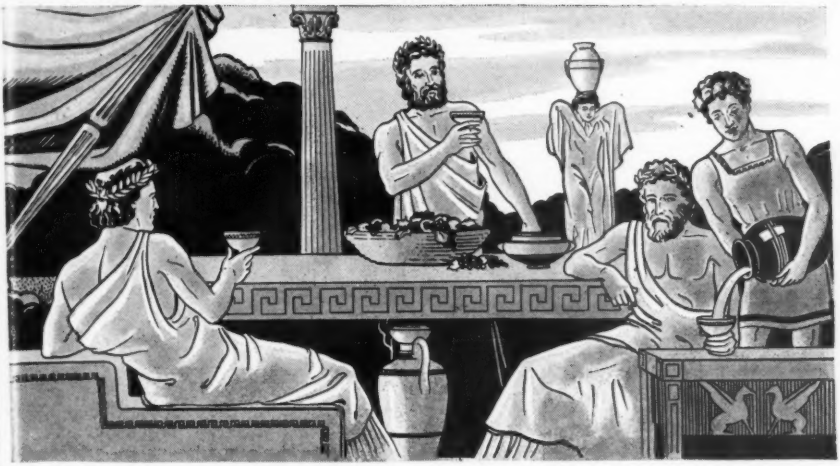

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